

## **Historic, archived document**

Do not assume content reflects current scientific knowledge, policies, or practices.

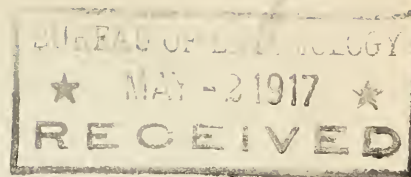


## EMERGENCY ENTOMOLOGICAL SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE.

Reporting Cooperation between Federal, State and Station

Entomologists and other Agencies.



Number 1.

Washington, D.C.

May 1, 1917.

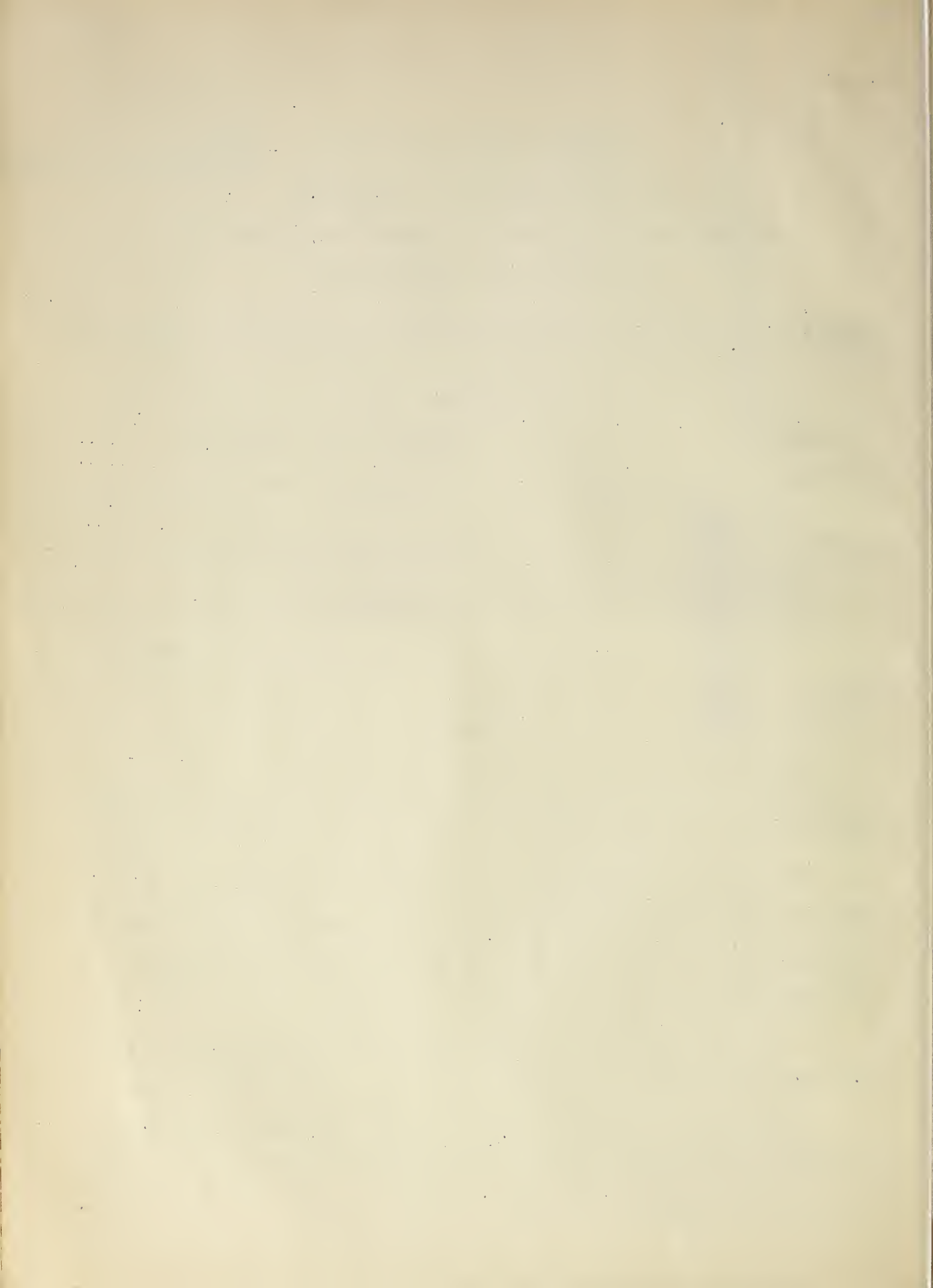
CONTENTS.

Foreword.....	Reports on Insect Conditions.....
	(Cont.).....
Suggestions from State and.....	Forest resources .....
Station Entomologists.....	Apiculture.....
Reports on Insect Conditions....	General Reports on Conditions .....
	in States.....
Cereal and Forage Crops.....	Miscellaneous.....
Southern Field Crops.....	
Truck and Stored Products.....	
Tropical and Subtropical.....	The Bioclimatic Law as Applied..
Fruits.....	to the Hessian Fly.....

FOREWORD.

Very gratifying replies have been received to the various letters which recently have been addressed to entomologists throughout the country regarding the great importance of reducing as far as possible, to meet the present emergency, the losses which are caused by insect attack on the staple crops of the country. Sympathetic and hearty cooperation has been promised by all entomologists of the country.

The work of the Bureau of Entomology in this connection is in co-operation with various other Department agencies. Demonstration agents, statistical agents, weather observers, foresters, and others, have agreed to make such reports as are needed to reveal any unusual insect occurrences throughout the country.



A large number of practical suggestions regarding this work have been made by the state and other entomologists outside of the Federal service. This promises well for the success of the undertaking. A number of these suggestions are noted below.

This is the first of a series of reports which we hope to send out at least monthly through the summer and autumn. A committee consisting of the chiefs of branches of the Bureau of Entomology has been appointed to take charge of this insect reporting and cooperative service.

I am sure that we are all going to pull together in this matter, and that the results will be of striking value to all of us and to the country. While you may not be enthusiastic over this first issue, I am sure that every one that follows will be more helpful than the one that preceded it. This certainly will be the case if the very great interest shown so far is continued. It is especially important that during May and June any indications of insect outbreaks be reported promptly by entomologists on account of their bearing on subsequent injury.

L.O.Howard.





## SUGGESTIONS FROM STATE AND STATION ENTOMOLOGISTS.

---

✓ Dr.W.E.Hinds states that in Alabama a special effort will be made towards the protection of food and forage crops. Frequent press notices will be issued dealing with such subjects of insect control as appear to be opportune. This work is in cooperation with the extension service in the state.

Mr.F.B.Paddock writes that in Texas close cooperation has been established with the extension service and that he believes much more can be done by this work than has been thought possible.

Professor T.B.Symons writes that an unusual campaign should be made in the spring for the control of the codling moth. He believes that as much publicity as possible should be given to this work and that he has taken up the matter actively in Maryland.

Professor R.A.Coley calls attention to the fact that in 1915 about one hundred thousand acres of fall wheat in his state was destroyed by the army cutworm. He believes that the next great forward step in entomology will be along the line of aiding the farmers to make use of the entomological information which already is available and looks upon the present movement as an important aid in that direction.

Professor W.J.Schoene states that his office has planned to cooperate with the extension agents in the various counties in Virginia and to issue letters calling the attention of these agents to the work of injurious insects with a view to reducing injury. He adds that the cooperative service will undoubtedly be the means of reducing damage throughout the country.

Mr.Wilmon Newell states that the State Plant Board of Florida has been very actively engaged in the prevention of insect losses in that State since the organization of the Board. Doctor Berger will now make even more strenuous efforts in this direction. An interesting communication from him is included in another part of this circular.

Mr.W.C.O'Kane suggests that the use of special blanks for reporting insect injury would be useful. This suggestion has been made by a number of other entomologists and is receiving consideration.

From Arizona Dr.A.W.Morrill writes that he has perfected plans for assisting local agents of the Bureau by the furnishing of transportation facilities. He also calls attention to the reported occurrence of large numbers of house flies in the military camps on the border and suggests special field work in this connection.

Dr.E.D.Ball writing from Madison, Wisconsin, states that he has known of several cases in which serious outbreaks of injurious insects





were not reported to either State or Federal entomologists until too late for adequate remedial measures. He hopes that the cooperative service will result in early information regarding all important outbreaks.

Professor Lawrence Bruner states that with the aid of funds which will probably soon be provided by the state, he expects to organize a special service in Nebraska. A large part of the work will be done through the press.

Professor A.F.Conradi also suggests the use of special forms. The opinion of entomologists on the subject is desired.

Doctor E.P.Felt states that in New York observations in the southern portion of the State frequently have been of service in forecasting developments further to the north and thinks that the general service which is being organized will be especially important on this account. He also calls attention to the great importance of entomological work in connection with military camps and states that he believes it is important that all classes of entomological information for use in the present emergency be distributed through local entomologists who may have data leading to modifications to suit local conditions.

Mr. F.W.Wallace of Indiana calls attention to the shortage of men for entomological work and suggests that the greatest need is for trained assistants. He also emphasizes the advisability of issuing very brief publications to be given widest publicity.

Professor C.W.Woodworth states that California has begun active emergency control work and is planning to place a party in the field at once to study the grasshopper conditions throughout the State.

In Illinois, Dr.S.A.Forbes has reorganized his force in such a way as to keep the various sections of the State under special observation. He also has arranged for reports from county agricultural officers, crop reporters of the State Department of Agriculture, and others. He has asked the legislature for an appropriation for a demonstration car which he believes would be especially useful at this time.

Mr. Sherman of North Carolina has issued the following notice:

"Owing to the necessity of producing large crops of food and feed crops this year, the Division of Entomology of the State Department of Agriculture at Raleigh has been requested by the officials at Washington to keep close watch for epidemics of insects affecting these crops. It is to be expected that there will be minor injuries from many kinds of pests as usual but it is especially desired that anything of an epidemic nature, such as Chinch Bugs, Army Worms, etc., which appear in immense numbers and are destructive over wide areas, be promptly reported as soon as their injuries become



evident. The help of county agents and citizens is requested in this matter."

Professor G.A.Dean of Kansas writes that a committee on insects has been appointed as a division of the state committee on agricultural production of the Kansas council of defense which was created by the Governor. The following persons constitute this committee: Geo.A.Dean, S.J.Hunter, O.F.Whitney, J.H.Merrill, E.O.G.Kelly, F.B.Milliken, T.H.Parks, P.W.Claassen.

Mr.Dean proposes the organization of the twenty-five or more working entomologists of the State into a unit divided into office and field forces. This organization will conduct a publicity campaign through farm papers, institutes, granges and county agents. It will send field men from time to time to keep in touch with threatened outbreaks, and organize the counties for concerted action. It is proposed to organize the counties by townships following the plan which was in operation in grasshopper control work several years ago. The entomologists in the field will exercise direct supervision over this work.





## REPORTS ON INSECT CONDITIONS.

### Cereal and Forage Crops.

The Hessian fly situation throughout the main wheat belt at the present time appears to be reassuring. It seems apparent that the very serious outbreak which occurred during the years 1915-1916 is following the course of all such outbreaks which have occurred since the year 1883. Since that year six outbreaks of a serious character have occurred not including the present one. In none of these cases has the general infestation lasted more than four years, and the crest of the outbreak has not occupied in any case more than two years. In the region east of the Appalachian Mountains the infestation has already subsided. So near as has been ascertained during the present spring, the infestation of the fly in this region is of no great importance. In fact it is very scarce in many places where it was abundant two years ago. Considerable infestation still exists throughout the southern part of Illinois and Indiana, in Missouri, northern Oklahoma and eastern Kansas, but the situation can not be considered acute. A late fall survey in southern Indiana and Illinois conducted by Mr. Davis revealed quite satisfactory conditions as owing to a dry summer very little volunteer wheat appeared and seasonal conditions prevented early sowing over large areas. Much of the wheat was sown after October 3rd and is nearly free of fly, although as usual some wheat was sown before the fly-free date and is heavily infested. Mr. Kelly reports that in some of the central counties of Kansas the loss from the Hessian fly this year will be very heavy, but in the Southern part of the State conditions are much more favorable and no great damage is anticipated. In the northern portion of the wheat belt, Hessian fly conditions are also satisfactory, the fall survey having shown that no serious general infestation is present.

An extensive flight of May beetles which has been designated as Brood A is expected to occur during the month of May throughout the northern portions of the United States. The focus of this flight appears to be the State of Michigan, and the latest reports from that State indicate that the beetles will be very numerous. This means a great infestation of grubs during the summer and early fall of 1918. A poster presenting graphically the life-history of the grubs and affording full directions for avoiding damage by them is in press and should be ready for distribution in an edition of 5000 copies not later than May 1st.

The dry weather which has prevailed so far this spring in those portions of the middle west most affected by the chinch bug makes it very probable that heavy losses from this pest may occur during the coming season. Doctor Forbes who has been watching the insect closely in Illinois for many years has issued warning that an outbreak of the insect is impending and states that although no survey has been made since





the bugs left their winter quarters that conditions point toward a probable heavy infestation. Several heavy flights of the bug have been recorded by Mr. Kelly as having occurred in Southern Kansas during April. A poster dealing with the situation is being prepared for publication.

Indications point to a possible outbreak of the western army cut worm a little later in the season in those states immediately bordering the Rocky Mountains, but no reliable information regarding the severity of the possible outbreak is as yet available. Steps have been taken to have suitable literature close at hand for distribution in the threatened region.

A report from Mr. Wildermuth of this branch states that the corn leaf aphid is more than usually abundant in the Southwestern States at present.

An outbreak of one of the aphids affecting barley, in San Luis Obispo County, California, has been reported by Mr. E. M. Davidson. The identity of the aphid is as yet unknown but it may be Macrosiphum granaria which occurs commonly in that region. The outbreak will be investigated and assistance rendered where possible.

The great outbreak of the spring grain aphid or Green Bug which occurred throughout Northern Texas, Oklahoma, Kansas, and Nebraska, during the summer of 1916, apparently has entirely subsided. The insect is reported as being present in Northern Texas but not in sufficient numbers to cause alarm. W. R. Walton.

#### Southern Field Crops.

The conditions of the past winter were such as to reduce the number of injurious insects materially. Examinations of large quantities of Spanish moss from various localities in Louisiana indicated that the low temperatures had destroyed many more than the usual numbers of weevils. It is quite evident that the number to emerge throughout the infested territory will be small. It is well known, however, that this does not necessarily indicate that the injury to the crop will be small. Favorable conditions for the weevil during June and July may offset the advantage of a comparatively small number emerging from hibernation.

The most direct benefit from the cold of the winter will be in the northern portion of the infested territory where the weevil has undoubtedly been killed out. Along the Gulf coast the injury is not likely to be reduced very much. The insect has already been reported in considerable numbers in Florida and Southern Georgia.



It is likely that the same conditions which have affected the boll weevil adversely will prevent an outbreak of the bollworm.

W.D. Hunter.

#### Truck Crop and Stored Products.

The Colorado potato beetle was the cause of a serious outbreak in the vicinity of Monticello, Florida, in early April. Mr. F. B. Williken, Wichita, Kansas, reported the Colorado potato beetle as appearing in large numbers in potato fields. An average of 25 beetles to 100 feet of row was noted where less than one-fourth of the hills had come up. Nearly all of the plants were badly eaten, as many as six beetles being found at some of them.

Overwintered cutworms are generally reported and are doing some damage to early truck crops such as onions and cabbage. However, their numbers do not indicate a severe outbreak.

Potatoes have also been reported by Mr. Thomas H. Jones as injured by the northern mole cricket at Grand Isle, La. It is especially injurious to the tubers.

Some interesting points in regard to potato insects have been recently brought up which, although not new, are worthy of mention. After the Colorado potato beetle has destroyed a crop of potatoes or after the crop is harvested, the beetles next attack eggplant if grown in the vicinity. This has been observed by the writer in the District of Columbia and in Louisiana by Mr. Jones. A correspondent at Somerset, Penna., reports that "slugs" or shellless snails, after destroying young and tender vegetation afterward work on potatoes in the ground, especially in the fall.

In the vicinity of Rocky Ford, Colo., according to Mr. H. O. Marsh, the season has been so backward that insects have caused little or no damage. He states that he has never known of a spring when insects were so rare.

Mr. D. E. Fink, in Tidewater Virginia, reports that the usual spring outbreaks of the pea aphid have occurred. Most other insects are late. Cutworms have been reported at Bladensburg, Md., cutting off peas as fast as they come up. In the same locality Mr. Duckett also reported the adults of May beetles when digging up the earth for planting seed. Species to be reported later.

F. H. Chittenden.





### Deciduous Fruit Insects.

Orchard insect pests on the whole vary much less in numbers from year to year than those attacking certain other classes of crops, and an unusually large proportion of them are subject to control by comparatively inexpensive methods, particularly spraying. The generally good prices obtained for fruit by growers during the preceding year and the prospects for continued good prices will undoubtedly result in an increased amount of spraying for insects and diseases during 1917. The larger progressive fruit growers as a rule understand this work thoroughly, and barring unusual insect conditions, will probably require but little special help from entomologists. There is however in the aggregate a very large number of owners of small, semi-commercial orchards and home orchards, who do not obtain maximum benefits from spraying, or who have not thus far undertaken spraying at all. Present Bureau correspondence indicates an increased interest in spraying on the part of such owners of orchards, and it would appear that the fruit crop for home consumption at least can be materially increased if owners of these small orchards are induced to do effective spraying. A wide-spread campaign on the part of Entomologists concerned to bring about more general and more effective spraying than ever before is very desirable and is no doubt being given proper attention by various experiment station and state workers, as it is by this Bureau. Owing to the widespread interest in the increased production of food crops, the time is most opportune to bring about more effective spraying and to introduce spraying to many of the smaller fruit growers who have heretofore largely neglected this work.

At the present writing no information has been received to indicate abnormal abundance in the country of any insect pest of pome or stone fruits, grapes, pecans, currants, gooseberries and cranberries, the crops covered by this office. While the grape berry moth continues very destructive in northern Ohio as pointed out in a recent letter by Prof. Gossard, this condition in that region has prevailed for some years and is now being rapidly improved in consequence of the cooperative work there under way between the Ohio Agricultural Experiment Station and this Bureau.

The apple-tree tent caterpillar seems to be on the wane in the New England States, though it is excessively abundant the present spring in the environs of Washington, its attack being confined largely to the wild cherry and other non-economic plants.

Although no reports have been received indicating unusual abundance of aphids, the continued cool and cloudy weather may result in unusual damage by these pests, especially by the rose aphid to apple. Dr. E. P. Felt





in a recent letter points out that the cool weather may also result in increased injury from the pear thrips in the Hudson Valley, as retarding the development of the buds and longer subjecting them to thrips attack.

Dormant tree spraying for the San Jose scale according to Bureau information has received average attention at least and no serious losses are to be expected from this source.

A.L.Quaintance.

#### Tropical and Subtropical Fruits.

Mr.R.S.Woglum reports that there is prospect of greater damage than usual from the principal citrus scale insects in Southern California. Many scale infested orchards were not fumigated last season owing to the lack of cyanide, which continues with the consequent likelihood of widespread and increased damage from scale insects during the coming season.

Mealy bug damage in California is apparently on the increase, more particularly in the coastal regions where temperature and humidity conditions are more favorable to these scale insects. Some control can be expected through the agency of imported parasites, and several effective sprays are available.

In Florida the big freeze has materially affected the abundance of citrus insect pests. Mr.Yothers reports living white fly and scale little in evidence, and that no damage of importance can be expected before October. The rust mite is also scarce, and while red spiders have been reported these are not worse than usual. Insecticide firms report a cessation of interest. A more detailed report on the effects of the freeze on subtropical insects will be presented in a later number.

Citrus culture in Louisiana has not fully recovered from the effects of the great hurricane of last year. The fluted scale has recently and is still increasing rapidly in New Orleans and vicinity, but will probably be brought under control through the agency of the Vedalia, in the breeding and distribution of which the state, station, and city are cooperating with the Bureau of Entomology, Mr. E.P.Barber of the Bureau being in charge of the work.

C.L.Marlatt.



### Insecticides.

The high cost of materials entering into the composition of insecticides has caused a marked increase in price of certain largely used articles, such as Paris green, arsenate of lead, etc. and may operate against the desired more general utilization of these materials in the protection of crops from insects. An important saving can usually be effected in the consolidation of orders for insecticides for a given neighborhood, or their purchase through fruit growers' associations, or other cooperative buying organizations. The importance of this saving is realized when it is remembered that the difference in cost of certain insecticides, as arsenate of lead, in small packages at retail stores over its cost in larger quantities from manufacturers or jobbers is often 100 per cent.

Letters from orchardists and others indicate the intention on the part of some to use cheaper, though less safe arsenicals, such as arsenite of lime. In view of this interest it would appear desirable to call to the attention of orchardists desiring to employ cheaper arsenicals the arsenate of lime, which can readily be made up at home as follows:

Fresh stone lime(90% CaO.....	5½ lbs.
Sodium arsenate(fused, dry powdered, 35% As <sub>2</sub> O <sub>5</sub> .....	10 "
Water.....	2½ gal.

Place the lime in a suitable container, then dissolve the sodium arsenate in a little boiling water and pour this solution over the lime to start it slaking. When slaking is well under way stir thoroughly and add more water as required until a total of 2½ gallons has been used. This will make about 35 pounds of arsenate of lime paste containing 18-20% of arsenic oxide (As<sub>2</sub>O<sub>5</sub>), approximately closely the amount of arsenic in arsenate of lead paste. With normal prices for the materials this will cost 3 to 4 cents per pound. Arsenate of lime can be used on apples, pears and grapes, hardy vegetables, etc., but should not be applied to plants with delicate foliage, such as the stone fruits. Use at the rate of two pounds to fifty gallons of spray.

Arsenate of lime can be used in bordeaux mixture or dilute lime-sulphur. When used in water the milk of lime made from slaking three or four pounds of stone lime should be added to each fifty gallons of water.

A vital feature of plans for controlling insect outbreaks is provision for a prompt and adequate supply of necessary insecticides in the region or regions where needed. Under present conditions of freight congestion the prompt movement of insecticides in quantity would be





difficult, and the delay might result in very important losses. Plans to meet this possible situation are doubtless being given careful consideration by different State officials. The cooperation of insecticide manufacturers in this connection can no doubt be counted upon.

A.L. Quaintance.

### Medical Entomology

The insects which come into consideration in medical entomology are of more or less regular occurrence, and their variations in numbers from time to time can hardly be forecasted as can fluctuations of crop pests. However, it is very evident that under camp conditions the house fly and other species which transmit diseases or are of importance on account of the annoyance they cause become very abundant. The Bureau therefore prepared the manuscript of a brief popular bulletin on insects which are of importance in military operations which will be printed in a short time.

The Chief of the Bureau has been conferring with the General Medical Board of the Council of National Defense concerning the organization and utilization of the medical entomologists of the country.

W.D. Hunter.

### Forest Resources.

While the investigations in forest entomology have no direct relation to increasing and conserving the food supply, they are of special importance in connection with the conservation of forest resources, in the interests of supplies for the Army and Navy and for the manufacture of farm machinery and implements.

In addition to the methods we have been able to recommend for the control of the most destructive insects affecting forest trees and crude products, the results of our investigations have been made available for meeting important needs of the army and navy relating to insect damage to seasoned lumber and finished hardwood products used for handles, oars, tent poles and other woodwork. Information on file shows that very extensive losses have been suffered in the army and navy supply depots from injuries to such supplies by the Lyctus powder post beetles.

In addition to the information contained in our Farmers' Bulletin 778 we are prepared to give instructions on the inspection and treatment of material that may be of very considerable value to the military service.





It is also evident that termites cause considerable damage to army and navy structures and stores which could be avoided through proper treatment and precautions as given in Farmers' Bulletin 750.

A.D. Hopkins.

### Apiculture.

The work in bee-culture is quite unlike that of other branches of the Bureau of Entomology, especially in the present emergency. The attention of the Office of Bee-Culture Investigations is now turned toward an effort to increase the honey crop immediately. There is danger of a sugar shortage and if overseas shipping facilities are increased the present high exportation of sugar will be increased. The 1916 honey crop has disappeared, a considerable quantity having been exported and the last of the crop sold at high prices. These facts indicate an unusual demand for honey in 1917.

Circulars are being sent direct to beekeepers in the chief producing regions urging them to increase production by increasing the number of colonies in so far as it can be done without decreasing the crop but especially by manipulating their bees in the best manner. Advice is being sent to fit local conditions. In parts of the Northwest, winter losses were excessive and arrangements are being made to have bees sent from the south to replace the loss, since prospects for a crop are poor in parts of the southwest. Crop prospects are good in most of the northern states. In the clover region beekeepers are being urged to buy or lease colonies in the hands of inexperienced beekeepers.

On April 23, a conference was held at Washington of teachers, supply manufacturers, editors of bee-journals and others, to outline a plan of action for the various agencies in beekeeping. Arrangements were made to obtain an adequate supply of paper honey containers, to make up for the present shortage of tin and glassware. A committee was appointed to consult the National Defense Board to have honey and supplies included in the preferred freight. It was learned that the manufacturers of supplies are already running their plants to full capacity and local dealers were urged to obtain adequate stocks to make prompt shipments. Home marketing of honey was advised, not only to enable the beekeeper to get good prices for his honey but also partially to reduce freight congestion difficulties. A special plea was made to the bee-journals to be careful in their market quotations and reports in the future.

The bee disease situation is improving rapidly under the apiary inspection system and no extraordinary losses are to be expected from this cause. Wintering losses are now greatly in excess of losses from disease and a special educational campaign will be carried on to reduce



this loss in the future.

Entomologists who are in position to assist in increasing honey production are asked to cooperate in these efforts. In a number of states apiary inspection is supervised by the state entomologists and in this work special emphasis may advantageously be placed on extension methods. Entomologists are invited to send information concerning special local problems in beekeeping which demand attention.

E.F. Phillips.

GENERAL REPORTS ON CONDITIONS IN STATES.

Florida.

WATSON, J.R. Prof. College of Agriculture, Gainesville, Florida.  
April 10, 1917.

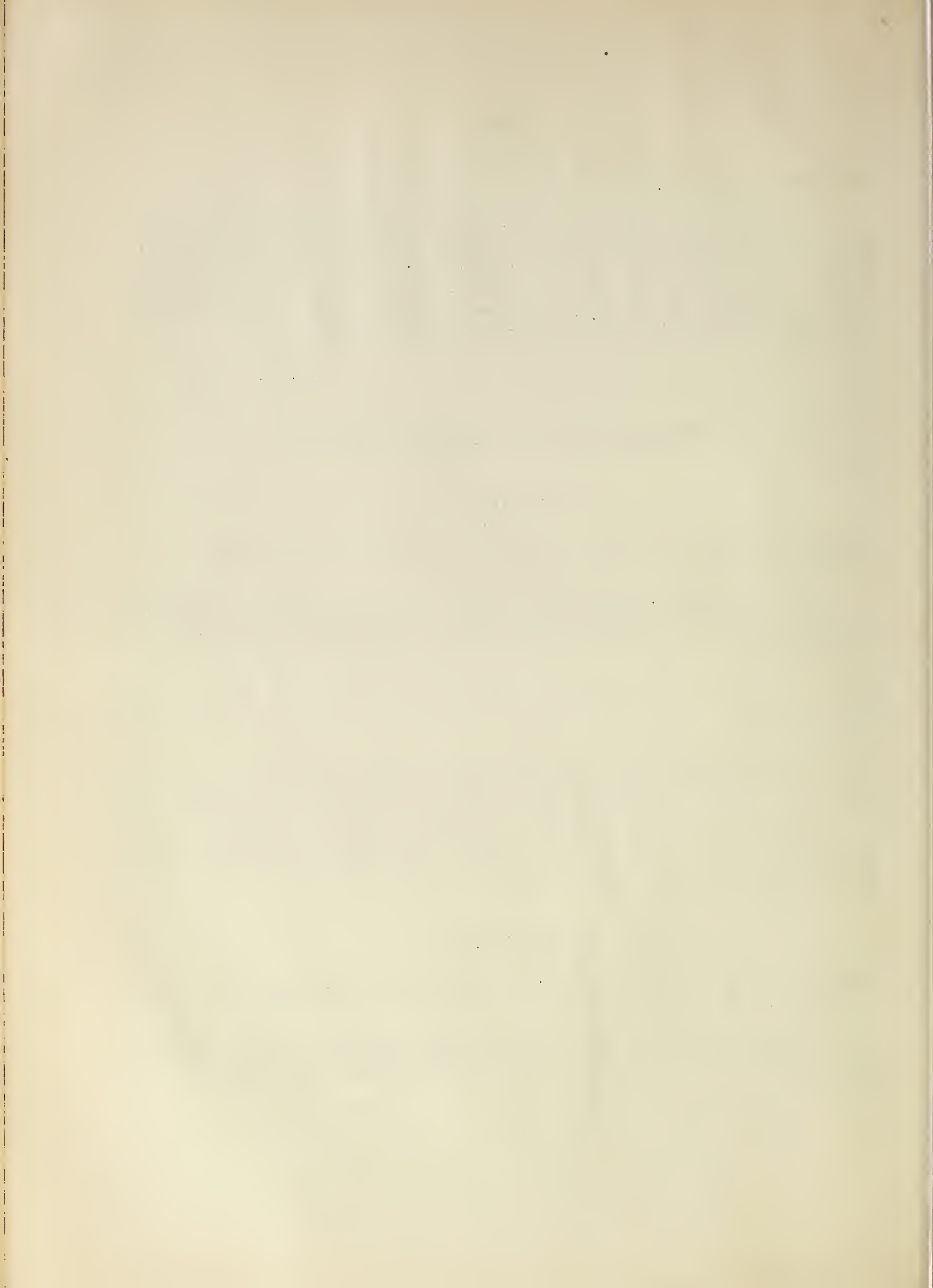
"I will state that we are already beginning to receive complaints, particularly of the work of the *Heliothis* in the buds of young corn. I may state what you probably already know that when Florida farmers complain of the "bud worm" in corn they have reference to the first generation of *Heliothis* and the work of the bud worm rather than *Diabrotica* injury. Except in the northern tier of counties the *Diabrotica 12-punctata* does very little damage here to corn."

"I will state also that we are having some complaints of the tree hopper on tomatoes and beans. The insect is *Stictoccephala inermis*. We have not heretofore been receiving complaints of this insect, but lately have had several complaints and I have found them rather common on beans about Gainesville. I should not, however, consider that the status was at all alarming at the present time."

North Carolina.

SHERMAN, FRANKLIN, Jr., Department of Agriculture, Raleigh, N.C.  
April 20, 1917.

"Insect damage in this state has been less this year than usual, and I have had no indication of any epidemic outbreak of destructive species."



GOSSARD, H.A. Prof., Agricultural Experiment Station, Wooster, Ohio.  
April 12, 1917.

"In a general way there is no present indication that we will have any great outbreak of insects injurious to staple crops. There is only a limited amount of Hessian fly in the state and, while we expect considerable damage from the wheat joint worm, no disastrous outbreak of this insect is looked for.

There are distinct indications of canker worm trouble over the eastern part of the state, and we suppose that the grape berry worm will be quite destructive again this year. We suspect the May beetles will be rather abundant in many parts of the state, and the plum curculio was much in evidence last year. We doubt if curculio has wholly subsided.

The tussock caterpillar has been on something of a rampage for one or two seasons and will probably be conspicuous this summer. The Colorado potato beetle was more numerous and difficult to control last year than during any time within the past 10 or 12 years; we suspect that it will need special attention this summer.

Aphids are present throughout the state in sufficient numbers to become something of a plague if weather conditions should favor their development, and thus far the situation would lead us to expect them to multiply without much hindrance.

The Datanas and forest caterpillars of various species were more numerous last year than for a long time. We shall keep a watch for them the coming season.

Last season was especially favorable to chinch bug development, but we know of no chinch bug centers in the state. If the weather should be very warm and dry, it would not be surprising if they got under considerable headway in some localities before this summer closes."

North Dakota.

WALDRON, C.B. Prof., Agricultural College, North Dakota. April 11, 1917.

"We are not looking for anything unusual in the way of insect troubles this coming season. There was only a small amount of Hessian fly in the state last summer, and there is no winter wheat grown in North Dakota and the fly has to winter in the stubble, there is no possibility of any serious outbreak, since practically all of our stubble land will be plowed and put into crop early in the season.







There were a few minor grasshopper outbreaks in the southwestern part of the state that we have already taken in hand, and I think there is no question but that the infested fields will be plowed early this spring or at least thoroughly dragged so as to break up the egg nests.

The damage from cutworms and wireworms last season was less than for some years, and it is not likely that there will be much loss from that quarter."

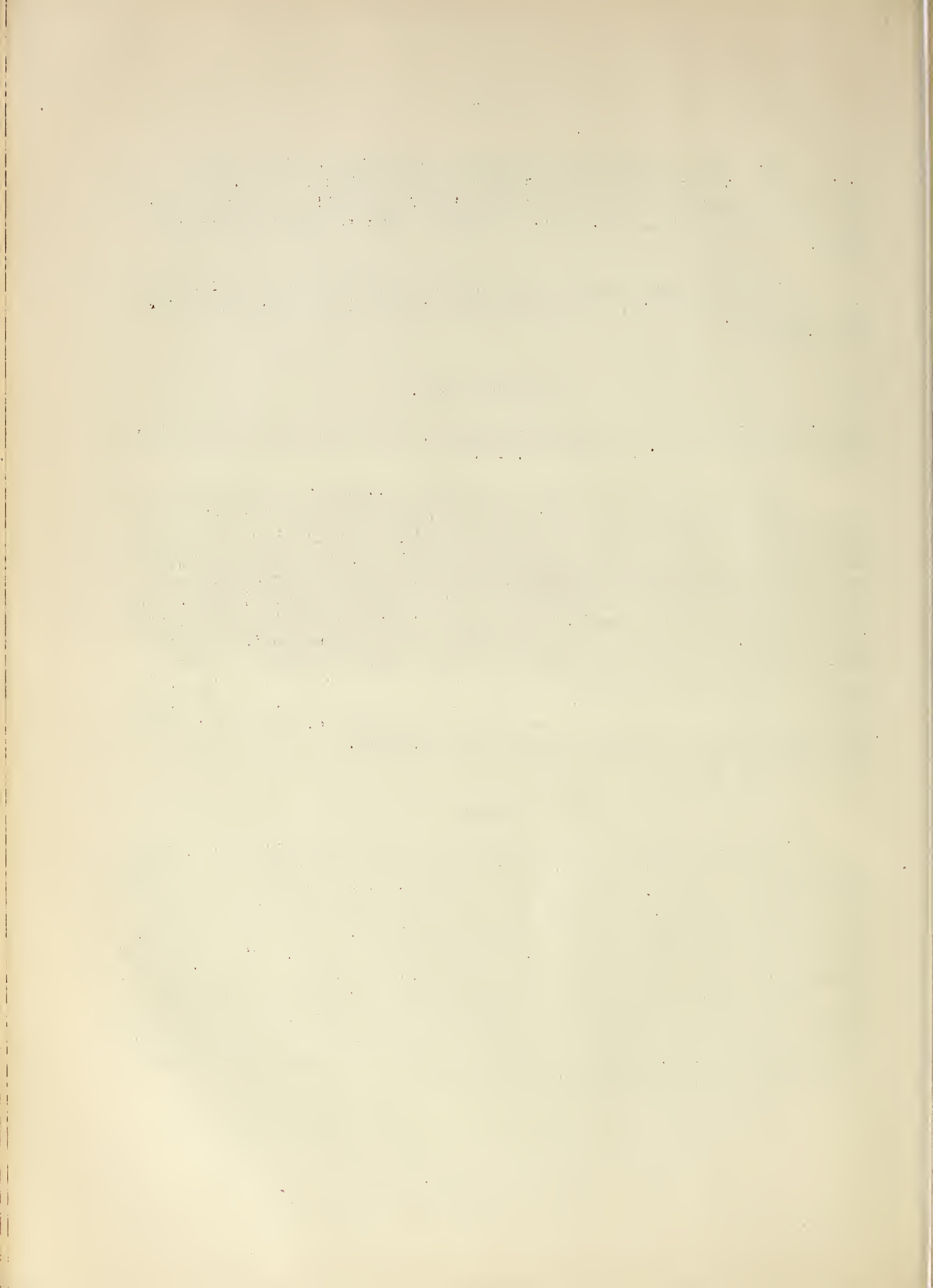
#### South Dakota.

SEVERIN, HARRY C., Mr., State Entomologist, State College of Agriculture, Brookings, S.Dakota., April 11, 1917.

"While it is yet too early to predict accurately outbreaks of insects and the geographical positions of these outbreaks, I think we may logically fear that we shall have considerable trouble with grasshopper, blister beetles, and crickets during the coming year. The grasshopper outbreak will probably be a general one in the western two-thirds of South Dakota. The same is also true of the blister beetle injury. The cricket outbreak will probably be confined to the central portions of South Dakota. Through examinations made by myself and assistants last fall, it was found that the blister beetles, while abundant in the grasshopper infested areas of South Dakota, were nevertheless insufficient to remove the grasshopper danger for the year 1917. We shall be glad to cooperate with the United States Department of Entomology wherever cooperation is essential and can be arranged."

#### Texas.

Prof. F.B.Paddock, College Station, reports that the greenbug is present in the northern portion of the state but that there are no indications of any special damage by it. The corn crop throughout the state is in good condition, and there have been less inquiries than in previous years concerning injury to the young plants. As far as the boll weevil is concerned the fall of 1916 was very favorable, but a number of sudden cold spells have undoubtedly killed large numbers of the insects. The codling moth and the peach curculio show indications of extensive injury. In truck crops the melon growers suffer heavy losses from aphids each year, and an outbreak is expected during the present season. Special means have been taken to inform the melon producers of the control of the aphids through the extensive service.



MISCELLANEOUS.

THE BIOCLIMATIC LAW AS APPLIED TO THE HESSIAN FLY.

The work on phenological and bioclimatic problems by the writer begun in West Virginia in 1895 in connection with his studies of farm garden and forest insects and continued to the present time, has resulted in working out and interpretation of a bioclimatic law of latitude, longitude and altitude which is found by him to have a wide range of application to the increased production of many crops as well as to the control of insects.

The writer proposes to present for publication in the Journal of the Department of Agriculture or the Monthly Weather Review a paper explaining this law in detail, but it seems desirable at this time to make a brief presentation of it in this connection on account of its special application to hessian fly control.

This law is manifested by variations in the time of certain periodical events in the seasonal development and activities of plants, insects, birds, etc., with variations in geographical positions and regional and local climatic conditions.

This variation, other things being equal, is at the rate of four days for one degree of latitude, five degrees of longitude and four hundred feet of altitude. In the spring and summer the course of the variation from the date of an event at any given place is earlier southward, westward and descending and in the autumn it is earlier northward, eastward and ascending.

The rate and course of the variations have been determined in Europe and this country mainly through a study of phenological records on plants, but of recent years the principal periodical events in the seasonal activities of certain insects, birds, and other animals and their geographical distribution as governed by latitude, longitude, altitude and local conditions have been studied and the results have contributed to rapid progress towards the accumulation of evidence in support of the law.

A knowledge of the law together with determined dates of phenological events at a few central places within a biological region enables one to prepare maps and calendars as guides to the proper time to begin and end control operations against many forest, farm and garden insects and those affecting the health of man and domestic animals.

In the case of the Hessian fly we have a striking example of the practical application of the law. Guided by recorded dates of the





general emergence of the fly next fall at a few northern localities in the United States and Canada and in each state where winter wheat is threatened by it, general map calendars of fly-free dates for sowing wheat can be prepared for the entire wheat region affected by the fly, and for each state in which there is special danger of damage from it. Such map calendars will make available to farmers the approximate dates within the range of the best time to sow wheat for any given farm within the range of the insect and, with the present knowledge of the habits of the fly and the influences of local topographical soils and weather conditions on the time of its general emergence, simple rules can be prepared to accompany the calendar maps which will enable each individual farmer to select the proper fly-free date for the immediate field or fields in which wheat is to be sown.

A special application of the law has just been made in a preliminary study of the determined dates for the fall emergence of the Hessian fly in relation to the reported general dates of sowing wheat in Kansas and to a study of the rate of departure of the earliest wheat harvest from the computed dates based on the law.

Briefly these studies have shown that --

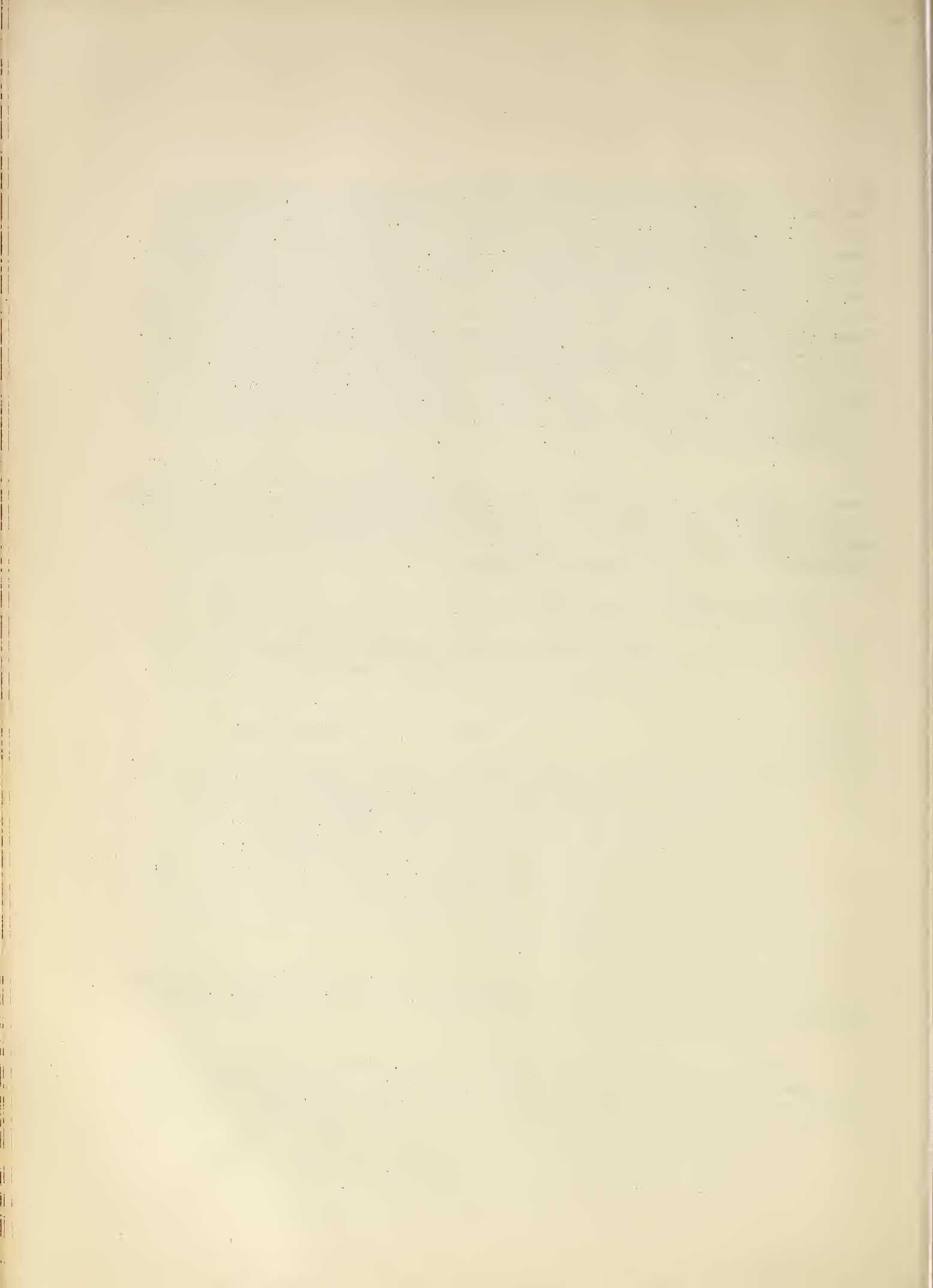
- a. The average fly-free dates computed for Kansas from determined dates at Wooster, Ohio, come within one to two days of the average dates given by Dr. Headlee as based on results of his special studies of the dates of the emergence of the fly in eastern and central Kansas.<sup>1</sup>
- b. The general average dates of sowing wheat in Kansas, as based on a large number of reports as compiled by the Office of Farm Management of the Department, have been six to fifteen days earlier than the computed and determined fly-free dates for the state east of about the 100th meridian and 2000 feet contour of elevation, while in the area east of this contour the sowing has been from five-tenths of a day to twenty-eight days later than the fly-free dates.

According to the estimates given by Mr. Dean, the losses from damage by the Hessian fly to wheat in Kansas in two years, 1915 and 1916, were over \$30,000,000.

The fact that in western Kansas, where the general date for sowing wheat is on or after the safe date to escape the fly, there has been little or no damage while in eastern Kansas where generally the wheat is sown too early to escape it, there has been very great damage, seems to

1. Bull. 188 Kansas State Agric. College Exp. Station, 1913.





be convincing evidence that if the farmers, generally, had sown their wheat in 1914 and 1915 after the given fly-free date and taken other well-known precautions, a large percentage of the thirty million dollar loss would have been prevented.

The results of a study of the departure of the dates of first wheat harvest in Kansas from the computed dates based on the general first wheat harvest in eastern Ohio, shows that the reported dates are two to four days later for altitude 1000 to 1500 feet, the same date for 1800 feet and five-tenths to ten days earlier for 2700 to 4000 feet.

This shows that there is only a slight difference in the determined and computed dates for the average emergence of the average first wheat harvest and verify the reliability of the law for long distance forecasting of phenological events. It also shows that in eastern Kansas there is a retarding influence while in the western part of the state there is an accelerating influence on the dates of wheat harvest as compared with the theoretical constant.

As a basis for forecasting under the bioclimatic law discussed in this number, the writer requests dates of first general appearance of May beetles, Rose chafer, and particularly the first general emergence of the spring and fall broods of the Hessian fly. In connection with these dates, should be noted the first opening of buds or flowers upon any trees or shrubs or plants in the vicinity. Give nearest post office, altitude above sea level, general topography, latitude and longitude, for each place of observation.

A.D.Hopkins.

